

Bryan (J. H.)

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J. H. BRYAN, M.D.,

OF WASHINGTON, D.C.,

LATE PASSED ASSISTANT SURGEON U. S. NAVY; LECTURER ON DISEASES
OF THE NOSE AND THROAT IN THE MEDICAL DEPARTMENT
OF THE COLUMBIAN UNIVERSITY; SURGEON TO
THE THROAT DEPARTMENT, GARFIELD
MEMORIAL HOSPITAL.



FROM
THE MEDICAL NEWS,

February 6, 1892.

[Reprinted from THE MEDICAL NEWS, February 6, 1891.]

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THE importance and rarity of acute edema of the larynx justifies me in calling attention to an interesting case of this affection that recently occurred in my practice :

On February 2, 1891, I was called in consultation with Dr. C. V. Boarman, of Washington, to see the patient, G. S., aged thirty years, a fish-dealer by occupation, and a man of strong physique. Upon entering his room I found him breathing rapidly and with great difficulty, but there was no audible stridor. The man's face was flushed and presented an anxious expression; the voice was husky, with a peculiar metallic quality; deglutition was painful and difficult. There was some swelling of the neck, and over the left thyroid gland there was an en-

¹ Candidate's thesis presented to and accepted by the Council for membership in the American Laryngological Association at its Thirteenth Annual Congress, September 13, 1891.



largement, about the size of a pigeon's egg, which was very painful on pressure. He expectorated a thick purulent secretion, the expulsion of which was attended by sharp, lancinating pain.

On examination of the throat, there was observed a slight redness of the posterior wall of the pharynx and of the fauces; but the parts could not be said to be the seat of active inflammation. By means of the laryngeal mirror, I found the epiglottis to be enormously swollen and very red, projecting from the base of the tongue over the laryngeal cavity, so that the interior of this could not be seen. Lying on either side of the swollen epiglottis, between it and the lateral walls of the pharynx, was thick, purulent secretion.

As the necessity for relief of the impending suffocation was so urgent, without further questioning the patient, I freely scarified the epiglottis with the laryngeal lancet. Each incision was followed by a discharge of blood and pus, and to encourage the discharge the patient was directed to gargle with warm water. In a short while, he expressed himself as feeling very much relieved, although I was unable to detect any diminution in the swelling of the epiglottis. Ice was applied externally, and the man was directed to swallow cracked ice frequently. In less than two hours the patient was again seen, and found in a state of great excitement, as he felt worse, and the dyspnea seemed to be increasing.

Examination showed the epiglottis still to be greatly swollen. I scarified again, making deeper incisions than before. The flow of blood was not very profuse, but the patient was able to expectorate more freely, the expectoration still being thick and purulent. This gave him more relief than he experienced from the first scarification, and the swelling was perceptibly lessened. Ice internally

and externally was continued during the night. On the following morning, the patient was somewhat improved as to breathing and deglutition, but the voice was about the same. The epiglottis was found to be still very much swollen—so much so that the interior of the larynx could still not be seen. Scarification with deep incisions was again practised.

At the Garfield Hospital, whither the patient was now sent, the following history was obtained :

He had had frequent attacks of sore-throat, but they were always mild in character, lasting only a few days. For the past three years he had led a very intemperate life, and on one occasion was confined in an inebriate-asylum. He had never had syphilis, but several years previously he had a small venereal ulcer on the prepuce, which healed in a few days; no constitutional symptoms have ever developed. On the 9th of November, he contracted gonorrhœa, for which he was treated by internal medication; but the discharge, while becoming less, never entirely ceased. On January 9th, he consulted a prominent surgeon, who, in addition to prescribing internal medication, passed a sound for the relief of a deep-seated stricture. The sound was passed for the second time, January 26th, and that night he had a severe chill; feeling ill on the following day, he took a Turkish bath, but without experiencing any relief. He continued to feel somewhat ill, with occasional chilly sensations, until February 1st, when he experienced a severe pain in the larynx, attended with great difficulty in breathing. About the same time he noticed that his neck was swollen. These symptoms increased in intensity until I saw him on the following day, and found the condition that I have already described.

February 3—the day of admission to the hospital : His temperature was 103° ; pulse, 106; respi-

rations, 30. There was a slight purulent discharge from the urethra. Examination of the urine revealed nothing abnormal, save a large number of pus-cells. I continued ice internally and externally; gave $\frac{1}{12}$ grain of muriate of pilocarpine hypodermatically, and kept water impregnated with the compound tincture of benzoin boiling in the room.

4th, 8 A.M. The temperature was $99\frac{4}{5}^{\circ}$; pulse, 96; respirations, 30. Noon, temperature, $103\frac{4}{5}^{\circ}$; pulse, 108; respirations, 36. At 8 P.M., temperature, $103\frac{1}{5}^{\circ}$; pulse, 112; respirations, 42.

The patient was restless and did not sleep during the night; breathing was easier; the voice was not so hoarse; he was still expectorating a purulent secretion; the swelling of the neck was subsiding. Examination with the mirror showed a marked subsidence of the swelling of the epiglottis. In the evening the man complained of severe pain in the epigastric region and at the lower border of the left lung. The treatment of the previous day was continued, and in addition 3 grains of salol were given every three hours.

5th, 8 A.M. Temperature, $103\frac{1}{5}^{\circ}$; pulse, 108; respirations, 48. Noon, temperature, $103\frac{4}{5}^{\circ}$; pulse, 102; respirations, 44. At 8 P.M., the temperature was $102\frac{2}{5}^{\circ}$; pulse, 112; respirations, 48.

The pain at the lower border of the left lung continues. Examination reveals a diminution of the respiratory murmur over the lower part of the left lung, both anteriorly and posteriorly. No râles and no dulness on percussion are detected; the patient complains of pain and numbness in the left arm. The swelling of the neck has entirely disappeared; the swelling of the epiglottis has subsided, and for the first time the arytenoid cartilages and the ary-epiglottic folds are visible. The whole larynx is intensely red, the congestion extending as

far down the trachea as can be seen. There is no indication of an abscess at the base of the tongue; the expectoration has ceased, and there is no pain on pressure over the larynx. The salol and ice were discontinued, and 3 grains of quinine were given every three hours; and the larynx was sprayed with a solution of tannin (gr. xx ad $\frac{2}{3}$ j) at similar intervals.

6th, 8 A.M. Temperature, $101\frac{3}{5}^{\circ}$; pulse, 118; respirations, 44. Noon, temperature, $102\frac{2}{5}^{\circ}$; pulse, 116; respirations, 52. 8 P.M., temperature, $101\frac{4}{5}^{\circ}$; pulse, 114; respirations, 52. A pronounced jaundice appeared this morning. The treatment of yesterday was continued, with the addition of tr. ferri chloridi, gtt. xx, every three hours.

7th, 8 A.M. Temperature, $100\frac{4}{5}^{\circ}$; pulse, 120; respirations, 50. Noon, temperature, $102\frac{1}{5}^{\circ}$; pulse, 120, respirations, 40. 8 P.M., temperature, $100\frac{4}{5}^{\circ}$; pulse, 122; respirations, 46. Jaundice still continues; the patient complains of pain in the left hypogastric region. Percussion shows no increase in the area of hepatic dulness, and there is no sensitiveness on pressure.

8th, 8 A.M. Temperature, $100\frac{4}{5}^{\circ}$; pulse, 120; respirations, 50. Noon, temperature, $102\frac{1}{5}^{\circ}$; pulse, 120; respirations, 50. 8 P.M., temperature, $100\frac{3}{5}^{\circ}$; pulse, 124; respirations, 50. The patient is very restless and weak; jaundice is not so marked; there is incessant cough, but no expectoration. Examination of the larynx shows no subsidence of the congestion, and there is little or no secretion in the larynx and trachea. About 9 o'clock on this evening, the patient complained of intense pain in the left hypogastric region, and suddenly cried out that "something had given way internally." I saw him at about 9.30, and found the abdomen somewhat distended and painful; the skin bathed in cold perspiration; the pulse feeble and scarcely

to be counted. He did not rally from this condition, and died at 1.30 A. M., death resulting probably from the rupture of an abscess of the liver.

It was unfortunate that a post-mortem examination could not be obtained, so that the diagnosis could be verified.

It is possible that the disease commenced as a primary erysipelas of the larynx, to which the pyemia was secondary. I think, however, that the history of the case points more forcibly to the urethra being the source of the infection that caused the blood-poisoning, with a secondary phlegmonous laryngitis.

The history of acute edema of the larynx dates from 1765, when Morgagni¹ found, upon post-mortem examination, a serous infiltration of the mucous membrane of the soft palate, fauces, and larynx. It was not, however, until 1808, when Bayle² read his remarkable essay before the School of Medicine of Paris, that this disease received a place in pathology. He unfortunately gave it the name of edema of the glottis, which term we frequently find applied to cases of edema of the larynx even at this late period. After Bayle came Tuilier,³ who in his thesis describes the symptoms of edematous laryngitis, and states that the fluid is either serous or sero-purulent. He was the first to establish by means of a digital examination the existence of cushions or pads caused by the swelling of the ary-epiglottic folds.

¹ *De Sedibus et Causis Morborum.*

² "Mem sur l'Œdème de la Glotte," *Journ. de Méd. de Paris*, 1819.

³ *Essai sur l'Angine Laryngée Œdemateuse.* Paris, 1815.

Finaz de Seisel,¹ was the first to suggest the passage of an elastic catheter into the larynx for the prevention of suffocation from edema of the larynx. It does not appear, however, that he ever performed this operation himself, but he had often seen it practised by Desault. Numerous memoirs appeared after those of Bayle and Tuilier, but it was Bouillard² that recognized the inflammatory nature of the disease. He reported three cases, in each of which the edema was of the secondary variety. Cruveilhier³ also recognized the inflammatory nature of the affection, and gave it the name of submucous laryngitis. He divided the disease into supra-glottic and infra-glottic edema. In 1852, Sestier⁴ wrote his elaborate treatise on edema of the larynx, and collected the surprising number of 245 cases. From these he compiled his statistical results, which have been made use of in every important communication on the subject since that time. In 1862, Mandl⁵ studied chronic edema of the larynx with the aid of the laryngoscope, and recognized the ary-epiglottic folds transformed into glistening cushions. This was the first communication on the subject after the introduction of the laryngoscope.

Acute edema of the larynx may arise quite independently of any inflammation; in such case it is

¹ Quelques Observations Chirurgicales récueillies à l'Hôtel-Dieu de Lyon. Paris, 1813.

² "Recherches et Mémoires pour servir à l'Histoire de l'Angine Laryngée (Edemateuse)," Archiv Gén. de Méd., 1825.

³ Traité de Anatomie Pathologique. Paris, 1852.

⁴ Traité de l'Angine Laryngée (Edemateuse. Paris, 1852.

⁵ "De la Laryngite (Edemateuse Chronique," Gaz. des Hôp., No. 69, 1862.

characterized by an infiltration of a serous fluid in the submucous connective tissue of the larynx. It may occur in the course of hepatic obstruction, in acute and chronic nephritis, from malarial cachexia, from blood-stasis in the course of chronic disease of the heart and lungs, and, according to Von Ziems-sen,¹ as a result of circumscribed obstruction in the laryngeal veins as a result of compression of the superior and inferior thyroid veins. That form due to inflammation is characterized by an infiltration of a serous, sero-purulent, purulent, and sometimes by a sero-sanguineous fluid in the submucous connective tissue. According to the statistics of Sestier, the disease seldom occurs before the age of fifteen years, and generally attacks persons between eighteen and fifty years of age, the majority of his cases being between eighteen and thirty-five years. Of 187 adults, 131 were men and 56 were women. Before thirty years of age the disease was generally a complication or sequel of some acute disease, while after that period it occurred in the course of chronic affections of the larynx.

In 1873, George von Hoffmann² found among 6062 post-mortem examinations made at the Berlin Charité, from 1869 to 1871, 33 cases of edema of the larynx, 10 of which were primary and 23 secondary. In 1879, Felix Peltesohn³ found, in 3387 post-mortem examinations made at the same insti-

¹ *Cyclopaedia of the Practice of Medicine*, vol. vii; N. Y., 1878.

² *Edema Glottidis*, Berlin, 31. März, 1873.

³ *Berl. klin. Wochenschr.*, October 28, 1889.

tution (from 1873 to 1878) 210 cases of acute edema of the larynx. Of these 149 were in men, 40 in women, and 21 in children. He found that the disease affected men generally between eighteen and sixty years, while the women were generally between eighteen and thirty-four years. Forty-four of his cases were due to local affections, and 164 were in consequence of general diseases.

In studying the etiology and prognosis of edema of the larynx, the statistics of Sestier cannot be taken as a guide, for it must be remembered that they were compiled before the days of the laryngoscope, when it was impossible to make a positive diagnosis. Furthermore, he did not separate the acute from the chronic form of the disease, and he included cases in which a dense deposit was present.

The statistics of Hoffmann and Peltesohn, having been taken from the post-mortem room, represent only the fatal side of the question; and, as the latter author states, if the records of a large clinic were available, other figures than he gives would be obtained. It would also be interesting to know what influence the modern treatment of this affection has had on the rate of its mortality. For this purpose I have collected the cases on record in the library of the Surgeon-General's Office of the United States Army, and have found reports of 96 cases. Of this number 86 were in adults—73 in men and 13 in women, 2 being in negroes—and 10 in children. The majority of the cases were between twenty and fifty years of age. In the cases of children, 7 were under six years, the youngest

being only five months. In 4 cases the edema was the cause of sudden death.

Edema of the larynx is said to be primary or secondary, but on this point authorities are not in accord. Gottstein¹ doubts whether it ever occurs as a primary affection, and believes that in the majority of cases it is partly or entirely due to local disturbances. Mackenzie² believes that in the cases of edema following simple inflammation, the disease is due to blood-poisoning. He states that in every case that has come under his observation ample opportunity of acquiring septicemia has been present. Virchow³ is of the opinion that in all cases of acute edema without a clear etiology, the affection is really one of primary erysipelas of the larynx. Cases do occur, however, that are apparently primary, and in nearly all of them there is a history of exposure to cold, while the body is in a low state of health or after great bodily fatigue. By reference to the tabulated list of diseases causing edema of the larynx, it will be observed that bodily fatigue and exposure to cold constituted the cause in thirteen cases. Marboux⁴ reports an interesting case, apparently of primary edema of the larynx, in a man, who prior to the attack was in perfect health. While bathing with some companions, his

¹ Die Krankheiten des Kehlkopfes, p. 100.

² Diseases of the Pharynx, Larynx, and Trachea, p. 201.

³ Verhandlungen der medicinischen Gesellschaft, Berlin, 11. Mai, 1887.

⁴ "Reflexion sur l'étiologie et la symptomatologie de l'Œdema de la Glotte," Rec. du Méd. de Paris, 1875, 3 sér., xxxi, 382.

head was forcibly submerged under the water, and in less than twenty-four hours he had a severe attack of edema of the larynx.

The disease occasionally occurs in the course of an acute laryngitis; but it is more frequently due to the extension of an inflammation of the adjacent parts. I find that it was the result of an acute pharyngitis in three cases, of tonsillitis in six cases, in three of which the inflammation had progressed to suppuration, and in one case it was due to an abscess in the tonsillar region.

Edema of the larynx is sometimes developed in the course of syphilitic and tuberculous inflammations of the larynx, although Gougenheim¹ thinks that true edema occurs very rarely in tuberculosis of the larynx, and, when it does occur, it is generally the result of caries of the cartilages. On the other hand, pseudo-edema is of much more frequent occurrence in the course of tuberculosis. This condition is not characterized by a collection of fluid in the cellular tissues, but by an infiltration of tuberculous material.

Diseases of the kidneys have long been recognized as constituting a cause of acute edema of the larynx, but an infrequent one. Fauvel,² in 1863, was the first to call attention to acute edema of the larynx as the primary symptom of disease of the kidneys. He reported three cases in which the edema was the first and only symptom of renal disease. Since that time Waldenburg³ and De

¹ "De l'Œdema Laryngien dans la Tuberculeuse du Larynx," Ann. des Maladies de l'Oreille et du Larynx, 1884, x, 226.

² Aphonie Albuminurique, Rouen, 1863.

³ Allg. med. Centralzeitung, 1865, 10.

Bary¹ have made similar observations, the latter author reporting a case of acute edema of the larynx in a child as the first symptom of acute nephritis following scarlet fever. Among the general diseases that seem to give rise to edema of the larynx may be mentioned typhoid and typhus fevers, debility following chronic malarial poisoning, rheumatism, septicemia, and pyemia.

The following is a tabulated list of the cases that I have collected, showing the diseases that preceded acute edema of the larynx:

LOCAL DISEASES OF THE THROAT AND LARYNX.	GENERAL DISEASES.
Acute laryngitis 9	Chronic disease of the
Subacute laryngitis . . . 1	kidneys 3
Pharyngitis 4	Typhoid fever 3
Erysipelas 3	Typhus fever 6
Tonsillitis 6	Debility following mala-
Abscess in tonsillar region . 1	rial fever 5
Tuberculosis of the larynx 3	Rheumatism 1
Diphtheria 1	Frost-bite and resulting
Syphilis of the larynx . 2	gangrene 1
Extension of an inflamma-	Gastric fever 1
tion of the cellular tissues	Septicemia 1
of the neck 1	Pyemia 1
Straining of the vocal cords 2	Part of a general edema
Scald throat 3	for which no cause
Consecutive to chronic	could be assigned . 1
bronchitis 1	Alcoholism 2
Ecthyma of the face extend-	Variola 1
ing into the larynx . . 1	Consequent on great bod-
	ily fatigue and exposure
—	to cold 13
38	—
	39

¹ Archiv für Kinderheilkunde, 1886, viii, 96.

Traumatism	5
Following the administra- tion of large doses of iodide of potassium . .	1
On forcible submersion of the head under water . .	1
	—
	7

Leaving the etiology in 12 cases unaccounted for.

In general, the edematous infiltration is developed in those parts of the larynx in which the submucous cellular tissue is in greatest abundance. These parts are the anterior surface of the epiglottis, the ary-epiglottic folds, and the ventricular bands.

Hajek¹ has recently made some interesting experiments on animals to discover the parts most prone to edematous infiltration. He finds that there is a layer of loose cellular tissue on the anterior surface of the epiglottis that passes up to within half a centimeter of its border and there ceases. From this point the membrane is firmly adherent to the cartilage. This cellular tissue on the anterior surface of the epiglottis is continuous with that lining the lateral walls of the pharynx in front of the pharyngo-epiglottic ligament. The ary-epiglottic folds are made up of two layers of cellular tissue, the internal being continuous with that found at the apex of the epiglottis on its arygeal surface, while the external is continuous with that lining the pyriform sinus and the lateral wall of the pharynx behind the pharyngo-epiglottic ligament. This arrangement of the submucous cellular tissue and the position of the pharyngo-

¹ "Anatomische Untersuchungen über das Larynx-ödem," Archiv für klinische Chirurgie, xlvi. 146.

epiglottic ligament, which divides this part of the larynx into anterior and posterior portions, have a very important influence on the course of an edema. It is frequently observed that in edema of the ary-epiglottic folds due to local causes, such as ulcers, traumatism, perichondritis of the arytenoids, the infiltration is limited by the pharyngo-epiglottic ligament; and it is only when the edema is of great intensity and the collateral inflammation is decided in degree that this ligament is broken through. As the submucous cellular tissue of the anterior surface of the epiglottis and that of the ary-epiglottic folds are separated by the pharyngo-epiglottic ligament and pass up into the lateral wall of the pharynx on either side of it, it is clear that inflammations of the pharynx may occasionally extend to the anterior surface of the epiglottis, and occasionally to the ary-epiglottic folds, accordingly as the inflammation is on a plane anterior or posterior to the pharyngo-epiglottic ligament. Edema of the anterior surface of the epiglottis never passes over the border of this cartilage to enter the laryngeal cavity, and it only passes over into the ary-epiglottic folds when the infiltration is so extensive as to break through the ligament.

The edema is generally confined to that part of the larynx above the vocal cords. It, however, occasionally extends below the cords affecting the trachea and bronchi. In rare cases, it is limited to that part of the larynx below the vocal cords, in which case it is known as the sub-glottic variety. This form of the disease was recognized by Sestier, Cruveilhier, and Gibb, and of the 96 cases I find

that 2 are of the sub-glottic variety: in one, reported by Gibb,¹ in a man thirty years of age, who had an inflammation of the cricoid cartilage due to traumatism, a resulting abscess caused edema of the sub-glottic space; in the other, reported by Lefferts,² in a boy five years of age, the disease followed exposure to cold. Both patients recovered.

The vocal bands are very rarely affected, as they contain very little cellular tissue. However, I find 2 cases recorded. In one reported by Natier,³ the infiltration was due to tuberculosis; in the other, reported by Semon,⁴ the edema was due to excessive use of the voice.

The order of frequency of the parts affected in my list of cases was: the epiglottis alone in 7; epiglottis and ary-epiglottic folds in 14; ary epiglottic folds alone in 5; soft palate and ary-epiglottic folds in 3; arytenoids and vocal bands in 1; right arytenoid in 1; arytenoids and commissure in 4; vocal bands alone in 2; right arytenoid and corresponding ary-epiglottic fold in 1; epiglottis and arytenoids in 1.

The disease is generally bilateral, but occasionally it affects only one half of the larynx. Feibert⁵ describes a case in which the edema was contiguous to an acute pharyngitis, and in which the infiltration

¹ Lancet, London, Sept. 4, 1869.

² New York Med. Journ., Aug., 1877.

³ Ann de la Polyclinique de Bordeaux, 1889, i, 71.

⁴ "Isolated Edema of the Vocal Cords," St. Thomas's Hospital Reports, vol. xiii.

⁵ "Zur Behandlung des circumscripten Kehlkopfödems," Wochenschr. d. k.-k. Gesellsch. d. Aerzte, Wien, 1870, 497.

was limited to the corresponding half of the larynx. S. Solis-Cohen¹ reports two cases, both of traumatic origin, and Lefferts² one case that followed exposure to cold.

Acute edema of the larynx occasionally sets in with such suddenness that no warning is given, and the patient dies before aid can be rendered. Generally, however, the onset is more gradual, and the patient complains of a sensation as of a foreign body in the throat, the removal of which he attempts by swallowing and by the insertion of the finger in the throat; deglutition is painful and difficult, the voice is altered in timbre, dyspnea is always present, and the inspirations are frequently accompanied by a whistling, stridulous sound, especially when the ary-epiglottic folds are the seat of the infiltration. The patient is restless and has an anxious expression, and unless relief is obtained the face becomes cyanotic, and death results from asphyxia.

The diagnosis of this affection is not difficult: the symptoms of stenosis, in connection with the dyspnea and the alteration of the voice, indicate the larynx as the part affected, and by means of the laryngeal mirror the nature of the affection is at once revealed. The tumefied parts are red, though sometimes translucent and pale-yellow in appearance. In the absence of the laryngoscope, exploration with the index-finger as recommended by Tuilier can be practised, when the swollen epiglottis or ary-epiglottic folds can be felt. Great care must be exer-

¹ THE MEDICAL NEWS, Phila., 1885, xlvi, 677.

² New York Med. Journ., Aug., 1877.

cised in carrying out this procedure for fear of causing suffocation.

Although acute edema of the larynx is a very serious affection, the prognosis is now not so unfavorable as it formerly was, owing to the practice of scarifying the swollen parts, and also to the early performance of tracheotomy when indicated. Sestier found that of 213 cases 158 proved fatal, in spite of tracheotomy having been performed in thirty. Bayle gives much more unfavorable figures, as 16 of his 17 cases proved fatal. Kühn (quoted by König¹) collected 95 cases, 36 of which were fatal. Of the 96 cases that I have collected, the disease proved fatal in 34, giving a mortality of 35 per cent., which is a little less than that given by Kühn. The prognosis must be greatly influenced by the cause of the edema and by the intensity of the inflammation, as well as by the age and sex of the patient. That form due to an extension of inflammation from the pharynx generally does well when taken in time, but when the inflammation is due to erysipelas, or to constitutional causes, such as typhoid fever, septicemia, and pyemia, the chances are extremely unfavorable. The disease is more serious in men than in women, while the greatest mortality is in cases between ten and forty years of age.

Prompt local measures must be employed in order to relieve the obstruction to respiration. In no severe disease is there such speedy relief obtained by means of a simple operation as in acute edema of the larynx from scarification of the swollen parts. Sometimes the relief appears almost magical. Pro-

¹ Lehrbuch der Chirurgie, Bd. i, 615.

posed and practised by Lisfranc in 1825, scarification did not receive the recognition of this eminent surgeon's colleagues, probably, as suggested by Dr. Bartlett,¹ on account of jealousy. We even find Cruveilhier,² a number of years later, saying he "doubts whether this little operation of scarification has ever been performed." It was not until 1847, when the late Dr. Gurdon Buck,³ unaware that scarification of the epiglottis had been previously performed by Lisfranc, practised it at the New York Hospital, and owing to his series of successes the operation became a popular one. It is best performed with the laryngeal lancet, with the aid of the laryngeal mirror, but in the absence of these it can be effected with the ordinary curved bistoury, covered, except for the last quarter-inch of its length, with adhesive plaster. After scarification, gargling with warm water will greatly facilitate the expulsion of fluid from the tissues. The cold coil or an ice-bag should be placed over the larynx, and the patient be directed to swallow cracked ice frequently. This, in conjunction with the hypodermatic injection of pilocarpine, as first proposed by Gottstein,⁴ will hasten the absorption of the fluid and often prevent a recurrence of the edema. The atmosphere of the room should be rendered moist by boiling water containing the compound tincture of benzoin. Inhalation of astringents will often assist in the absorp-

¹ "The History, Diagnosis, and Treatment of Edematous Laryngitis," Western Journ. Med. and Surg., Louisville, 1850, vol. xxxiii, 209.

² Dict. de Méd. et de Chir. pratique, "Laryngite," xi, 41.

³ Trans. Amer. Med. Assoc., Phila., 1848, i, 135.

⁴ Die Krankheiten des Kehlkopfes, S. 104.

tion of the infiltrated fluid and the restoration of the inflamed membrane to health.

If, in spite of the scarification, the edema continues and the dyspnea increases, then tracheotomy should be performed without further waiting. The lives of many patients have been saved by the early performance of this operation ; and remembering the liability of the edema to extend into the trachea, it is best to operate low down, making sure that the knife has entered the trachea, so that the tube will not pass between the swollen mucous membrane and the wall of the trachea—an accident that has happened to good operators.

Intubation has been successfully practised by Desault,¹ Macewen,² Meier,³ Ingals,⁴ and Altamirano,⁵ but it has not been performed often enough for any estimation of the value to be placed upon it as a substitute for tracheotomy. Its efficiency, of course, depends upon the part of the larynx that is edematous. Ingals refers to one case in which the obstruction to respiration could not be relieved by the laryngeal tube. It would seem, however, that cases of chronic edema and those acute cases in which the edema is moderate in degree and in which there is danger of paralysis or spasm of the posterior cricoarytenoid muscles, such as in the unfortunate case reported by J. Solis-Cohen,⁶ are best suited for intubation.

¹ Charazac : *Étude sur l'Œdème du Larynx*, Paris, 1885.

² Brit. Med. Journ., Dec. 28, 1878.

³ Med. Record, May, 1888.

⁴ Sajous's Annual, vol. iv, 1890.

⁵ Ibid.

⁶ Diseases of the Throat and Nasal Passages, p. 443.

The Medical News.

Established in 1843.

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